## REMARKS

Claims 1-27 are currently pending in this application. Claims 1-5, 7-9, 11, 13-18, 20-24 and 26-27 have been amended to more particularly point out Applicant's invention. No new matter has been added to this application.

Applicants wish to thank Examiner Lu for the telephone interview on May 2, 2005. Applicants have amended the claims to recite a method for diagnosing three dimensional medical imaging data and to clarify that the object being diagnosed is an anatomical object. Applicants believe that these changes place the claims in condition for allowance and request that the Examiner accept this supplemental amendment. Applicants have repeated the remarks section submitted in the amendment dated April 22, 2005 for the Examiner's convenience.

**Rejection of Claim 1 under 35 U.S.C. § 103 (a)**

The Examiner has rejected claim 1 under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 4, 674, 046 (Ozeki) in view of U.S. Patent No. 5,842,473 (Fenster). The Examiner correctly notes that Ozeki does not teach or disclose displaying a plurality of views of a given object at predefined angles in the rotation that are displayed in sequence as a cine loop. The Examiner contends that Fenster discloses using an animation function to create animated sequences of displayed views. The Examiner argues that it would have been obvious to one of ordinary skill in the art to display the plurality of views at predefined angles in the rotation that are displayed in Ozeki in sequence as a cine loop. Applicants respectfully traverse the rejection.

The present invention is directed to a computer assisted diagnosis system and method for assisting diagnosis of three-dimensional digital image data. Three-dimensional objects within the three-dimensional image data are identified. For a given three-dimensional object, a local spinning plane for the given object is determined. The local spinning plane is centered at a centroid

and a local spinning axis of the given object. The local spinning plane is rotated at least a portion of 360 degrees. As recited in amended claim 1, a view of the given object at computer selected increments of rotation is automatically created so as to result in a plurality of views of the given object at computer selected angles of the rotation that are displayed in sequence as a cine loop. The present invention takes incremental angles and uses the angles to order frames within the cine loop.

Ozeki discloses a method for obtaining three dimensional tomographic images by interpolation of a plurality of projection slices. An orientation angle of the image can be changed by manually inputting coordinate information. A slice position image representing the designated position and angle of the slice is displayed three-dimensionally in accordance with the coordinate information. As indicated in Applicants' previous response, Ozeki teaches using individual angles that are manually selected by the user and does not teach or disclose presenting the plurality of views as a cine loop or that the plurality of angles are computer selected. As such, Applicants submit that Ozeki does not teach or disclose Applicants' invention as claimed.

Fenster discloses a three dimensional ultrasound imaging system that includes an ultrasound probe to direct ultrasound waves and to receive reflected ultrasound waves from a target volume of a subject under examination. The animation icon allows a user to select the number of intermediate views of the displayed image which are to be computed and displayed. The user can also adjust image size, assign an identifier to the animation sequence and preview the animation (see col. 17, lines 23-41). As with Ozeki, in the Fenster system the user must manually select the views which are then displayed in animation mode. The Fenster system does not automatically create a view of the given object at computer selected increments of rotation so as to result in a plurality of views of the given object at computer selected angles of the rotation that are displayed in sequence as a cine loop.

Furthermore, the present invention discloses taking views at incremental angles of a rotation and using a non-temporal quantity, in this case the angle, to order the frames within the cine loop rather than using an acquisition time to order the cine loop. Applicants respectfully submit that neither Ozeki nor Fenster, whether taken alone or in combination, teach or disclose Applicants' invention and request that the rejection of claim 1 under 35 U.S.C. § 103 (a) be withdrawn.

**Rejection of Claims 2-27 under 35 U.S.C. § 103 (a)**

The Examiner has rejected claims 2-27 under 35 U.S.C. § 103 (a) as being unpatentable over Ozeki in view of Fenster and further in view of U.S. Patent No. 5,838,815 (Gur). The Examiner correctly notes that neither Ozeki nor Fenster teach or disclose receiving indicia identifying at least one region of interest in a digital medical image or identifying three dimensional objects with in the least region of interest. The Examiner contends that Gur teaches obtaining a mammogram image and identifying suspicious masses in the breast region. The Examiner argues that it would be obvious to a person of ordinary skill in the art to apply the combined Ozeki's and Fenster's system to perform image processing on the objects disclosed in Gur by presenting the object in different viewing angles to the physician to determine if the object is abnormal. Applicants respectfully traverse the rejection.

As indicated above, Ozeki does not teach or disclose displaying the plurality of views as a cine loop as recited in independent claims 2 and 15. Applicants further submit that the combination of Ozeki and Fenster do not teach or disclose displaying a plurality of views taken at computer selected angles of the rotation in sequence as a cine loop. Gur discloses a method of detecting an abnormal region in living tissue as depicted in a digital radiograph. In the Gur method, a suspected abnormal region is identified and multiple topographic layers of the suspected abnormal region are extracted from the digital

radiograph. Features of the region are determined in each of the layers and an inter-layer multivariate criterion is applied to the features to determine if the suspected abnormal region in fact is an abnormal region. As indicated in Gur, each layer is examined individually to determine its features and is analyzed multiple times. However, no teaching or disclosure is made of displaying the layers in a cine loop.

The Examiner also contends that Ozeki teaches performing linear interpolation on the tomographic slices. Applicants respectfully submit that interpolation of 3D data is not the same thing as connected components within a volume. Interpolation merely resamples the data to change the resolution to be higher or lower than the original format. Interpolation does not determine the extent of objects within the data. Interpolation takes an image volume that is *A* rows by *B* columns by *C* frames and resamples it to be *X* by *Y* by *Z*. The output of an interpolation is an image with the same appearance as the original, although at higher or lower resolution. Interpolation is analogous to zoom. If the input image has voxels with values ranging from 0 to 100, the output image will also have values ranging from 0 to 100.

On the other hand, connected components determines for every voxel within the image volume, which are part of the same object. Connected components determine for every voxel within the image volume which voxels are part of the same object. Connected components also compute how many distinct objects are within the volume. The output of connected components computation is a labeling of each voxel according to the unique component to which it belongs. This is not the case in interpolation.

For example, consider an input image which contains background plus two foreground objects that are not touching. The output of a connected components computation would contain a zero in every background voxel, a 1 for every voxel corresponding to the first component, and a "2" for every voxel corresponding to the second component appears. If the two components were

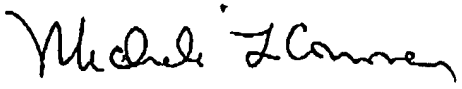
touching each other within the image, then an automatic analysis would perceive only 1 single component, and the output would consist only of 0s and 1s, even though the input image might have values ranging from 0 to 100.

Applicants submit that neither Ozeki, Fenster nor Gur, whether taken alone or in combination, teach the use of connected components of the present invention. Applicants further submit that Gur, like Ozeki and Fenster, does not teach or disclose displaying a plurality of views taken at computer selected angles of the rotation in sequence as a cine loop. Furthermore, the combination of Ozeki, Fenster and Gur do not each Applicants' invention. In addition, neither Gur nor Ozeki nor Fenster, whether taken alone or in combination, teach or disclose angles of the rotation in sequence as a cine loop as recited in displaying a plurality of views taken at predefined independent claims 2 and 15. Claims 3-14 and 16-27 being dependent upon independent claims 2 and 15 respectively are also not taught or disclosed by the combination of Ozeki, Fenster and Gur. Applicants request that the rejection of claims 2-27 under 35 U.S.C. § 103 (a) be withdrawn.

**Conclusion**

Applicant respectfully submits that claims 1-27 are in condition for allowance and request that a timely Notice of Allowance be issued in this case. The Examiner is invited to contact the undersigned should he have any questions in this matter.

Respectfully submitted,



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